

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
11 May 2000 (11.05.2000)

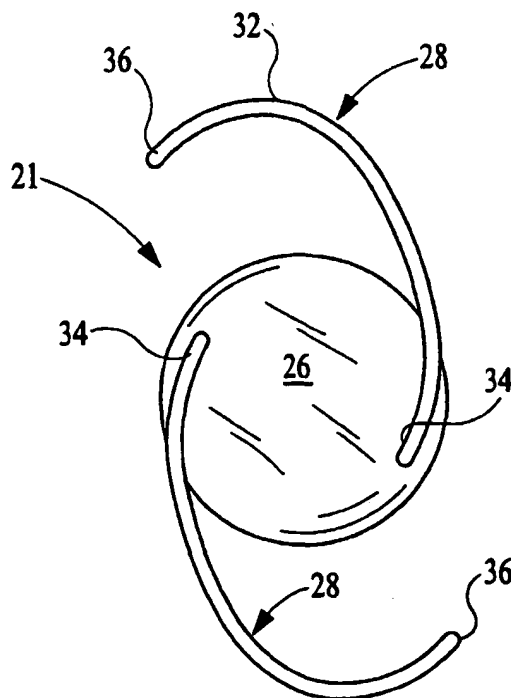
PCT

(10) International Publication Number
WO 00/26698 A1

- (51) International Patent Classification⁷: G02B 1/04, A61L 27/00 (74) Agents: DONOVAN, Stephen et al.; Allergan Sales, Inc., 2525 Dupont Drive, Irvine, CA 92612 (US).
- (21) International Application Number: PCT/US99/24982 (81) Designated States (*national*): AU, BR, CA, JP, KR.
- (22) International Filing Date: 25 October 1999 (25.10.1999) (84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/106,381 29 October 1998 (29.10.1998) US
09/265,720 9 March 1999 (09.03.1999) US
09/286,356 5 April 1999 (05.04.1999) US
- (71) Applicant: ALLERGAN SALES, INC. [US/US]; 2525 Dupont Drive, Irvine, CA 92612 (US).
- (72) Inventors: MAKKER, Harish, C.; 27371 Osuna, Mission Viejo, CA 92691 (US). LIAO, Xiugao; 24 Del Ventura, Irvine, CA 92606 (US). WEINSCHENK, Joseph, I., III; 37 Dover Place, Laguna Niguel, CA 92677 (US).
- Published:
— with international search report
— with amended claims
- Date of publication of the amended claims: 13 July 2000
- (48) Date of publication of this corrected version: 13 September 2001
- (15) Information about Correction:
see PCT Gazette No. 37/2001 of 13 September 2001, Section II

[Continued on next page]

(54) Title: INTRAOCULAR LENSES MADE FROM POLYMERIC COMPOSITIONS



(57) Abstract: Ophthalmic lenses, such as intraocular lenses, include cross-linked polymeric materials having a first constituent derived from a first monomeric component selected from the group consisting of acrylates, methacrylates and mixtures thereof, and a second constituent derived from a second component in an amount effective as a cross linker in the cross-linked polymeric material. The cross-linked polymeric material has branched chain alkyl groups, preferably included with at least a portion of the first monomeric component, in an amount effective to reduce the tackiness of the cross-linked polymeric material relative to a substantially identical cross-linked polymeric material without the branched chain alkyl groups.

WO 00/26698 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



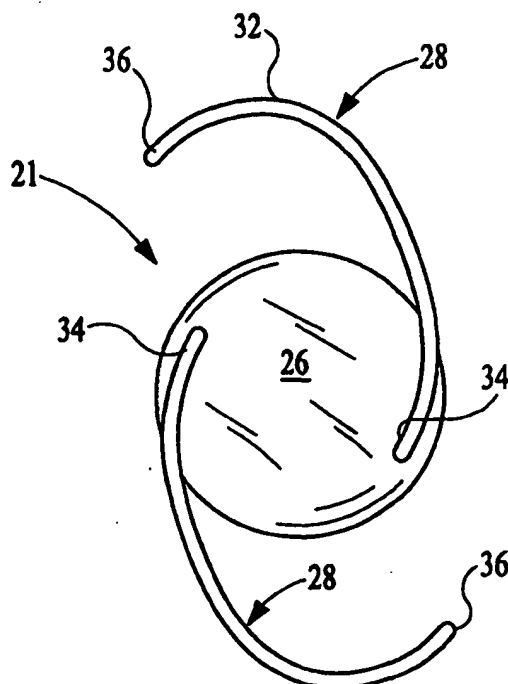
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G02B 1/04, A61L 27/00		A1	(11) International Publication Number: WO 00/26698
			(43) International Publication Date: 11 May 2000 (11.05.00)
(21) International Application Number: PCT/US99/24982		(81) Designated States: JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
(22) International Filing Date: 25 October 1999 (25.10.99)			
(30) Priority Data:			
60/106,381	29 October 1998 (29.10.98)	US	
09/265,720	9 March 1999 (09.03.99)	US	
09/286,356	5 April 1999 (05.04.99)	US	
(71) Applicant: ALLERGAN SALES, INC. [US/US]; 2525 Dupont Drive, Irvine, CA 92612 (US).		Published With international search report. With amended claims.	
(72) Inventors: MAKKER, Harish, C.; 27371 Osuna, Mission Viejo, CA 92691 (US). LIAO, Xiugao; 24 Del Ventura, Irvine, CA 92606 (US). WEINSCHENK, Joseph, I., III; 37 Dover Place, Laguna Niguel, CA 92677 (US).		Date of publication of the amended claims: 13 July 2000 (13.07.00)	
(74) Agents: DONOVAN, Stephen et al.; Allergan Sales, Inc., 2525 Dupont Drive, Irvine, CA 92612 (US).			

(54) Title: INTRAOCULAR LENSES MADE FROM POLYMERIC COMPOSITIONS

(57) Abstract

Ophthalmic lenses, such as intraocular lenses, include cross-linked polymeric materials having a first constituent derived from a first monomeric component selected from the group consisting of acrylates, methacrylates and mixtures thereof, and a second constituent derived from a second component in an amount effective as a cross linker in the cross-linked polymeric material. The cross-linked polymeric material has branched chain alkyl groups, preferably included with at least a portion of the first monomeric component, in an amount effective to reduce the tackiness of the cross-linked polymeric material relative to a substantially identical cross-linked polymeric material without the branched chain alkyl groups.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon	KR	Republic of Korea	PL	Poland		
CN	China	KZ	Kazakhstan	PT	Portugal		
CU	Cuba	LC	Saint Lucia	RO	Romania		
CZ	Czech Republic	LI	Liechtenstein	RU	Russian Federation		
DE	Germany	LK	Sri Lanka	SD	Sudan		
DK	Denmark	LR	Liberia	SE	Sweden		
EE	Estonia			SG	Singapore		

AMENDED CLAIMS

[received by the International Bureau on 11 May 2000 (11.05.00);
original claims 1, 4, 15 and 20 amended; original claims 18 and 19 cancelled;
claims 21-24 added; remaining claims unchanged (5 pages)]

1. An ophthalmic lens body comprising a cross-linked polymeric material comprising a first constituent derived from a first monomeric component selected from the group consisting of acrylates, methacrylates and mixtures thereof, and a second constituent derived from a second monomeric component in an amount effective as a crosslinker in the cross-linked polymeric material, at least a portion of the first monomeric component includes branched chain alkyl groups and provides about 1% or less to about 25% by weight of the cross-linked polymeric material, the cross-linked polymeric material having branched chain alkyl groups in an amount effective to reduce the tackiness of the cross-linked polymeric material relative to a substantially identical cross-linked polymeric material without the branched chain alkyl groups.

2. The ophthalmic lens body of claim 1 which is selected from the group consisting of optics of intraocular lenses, contact lenses and corneal implants.

3. The ophthalmic lens body of claim 1 which is a deformable optic of an intraocular lens.

4. The ophthalmic lens body of claim 1 wherein the at least a portion of the first monomeric component including branched chain alkyl groups provides about 3% to about 25% by weight of the cross-linked polymeric material.

5. The ophthalmic lens body of claim 1 wherein the cross-linked polymeric material includes a third constituent derived from a third monomeric component, other than the first and second monomeric components, selected

from the group consisting of acrylates, methacrylates and mixtures thereof.

5 6. The ophthalmic lens body of claim 4 wherein the cross-linked polymeric material includes a third constituent derived from a third monomeric component, other than the first and second monomeric components, selected from the group consisting of acrylates, methacrylates and mixtures thereof.

5 7. The ophthalmic lens body of claim 6 wherein the first monomeric component is selected from the group consisting of acrylates having a branched chain alkyl group and mixtures thereof and the third monomeric component is selected from the group consisting of methacrylates and mixtures thereof.

8. The ophthalmic lens body of claim 1 wherein the branched chain alkyl groups are selected from the class consisting of alkyl groups having 3 to about 20 carbon atoms and mixtures thereof.

9. The ophthalmic lens body of claim 1 wherein the branched chain alkyl groups are selected from the class consisting of about 6 to about 15 carbon atoms and mixtures thereof.

10. The ophthalmic lens body of claim 1 wherein the cross-linked polymeric material has an index of refraction of at least about 1.50.

11. The ophthalmic lens body of claim 1 wherein the cross-linked polymeric material includes aryl-containing groups in an amount effective to increase the index of refraction of the cross-linked polymeric material relative

- 5 to the index of refraction of a substantially identical cross-linked polymeric material without the aryl-containing groups.

12. The ophthalmic lens body of claim 1 wherein the cross-linked polymeric material has a glass transition temperature of about 22°C or less.

13. The ophthalmic lens body of claim 1 which is substantially homogeneous.

14. The ophthalmic lens body of claim 1 wherein the cross-linked polymeric material is substantially free of hydrophilic groups effective to reduce the tackiness of the cross-linked polymeric material.

15 15. The ophthalmic lens body of claim 1 wherein the at least a portion of the first monomeric component including branched chain alkyl groups is selected from the group consisting of 2-ethylhexyl acrylate, 2-ethylhexyl methacrylate, 2,2-dimethylpropyl acrylate, 2,2-dimethylpropyl methacrylate, trimethylcyclohexyl acrylate, trimethylcyclohexyl methacrylate, isobutyl acrylate, isobutyl methacrylate, isopentyl acrylate, isopentyl methacrylate and mixtures thereof.

10

16. The ophthalmic lens body of claim 1 wherein the second monomeric component is selected from the group consisting of tetraethylene glycol dimethacrylate, alkyl acrylate, alkyl methacrylate, trifunctional acrylates, 15 trifunctional methacrylates, tetrafunctional acrylates, tetrafunctional methacrylates and mixtures thereof.

17. The ophthalmic lens body of claim 5 wherein the third monomeric component is selected from the group

consisting of benzyl acrylate, benzyl methacrylate, phenyl
acrylate, phenyl methacrylate, phenoxy alkyl acrylates,
5 phenoxy alkyl methacrylates, carbazole acrylates, carbazole
methacrylates, biphenyl acrylates, biphenyl methacrylates,
naphthyl acrylates, naphthyl methacrylates and mixtures
thereof.

18. Cancel

19. Cancel

20. An intraocular lens sized and adapted to be
deformed for insertion through an incision into a mammalian
eye, the intraocular lens comprising a cross-linked
polymeric material comprising a first constituent derived
5 from a first monomeric component selected from the group
consisting of acrylates having a branched chain alkyl
group, methacrylates having a branched chain alkyl group
and mixtures thereof, a second constituent derived from a
second monomeric component in an amount effective as a
10 cross linker in the cross-linked polymeric material, and a
third constituent derived from a third monomeric component,
other than the first and second monomeric components, the
homopolymers of which have an index of refraction of at
least about 1.50, the first monomeric component provides
15 about 1% or less to about 25% by weight of the cross-linked
polymeric material, the cross-linked polymeric material
having branched chain alkyl groups in an amount effective
to reduce the tackiness of the cross-linked polymeric
material relative to a substantially identical cross-linked
20 polymeric material without the branched chain alkyl groups.

21. The ophthalmic lens body of claim 1 wherein the
cross-linked polymeric material is substantially free of a
fluoro-containing constituent.

25 22. The intraocular lens of claim 20 wherein the cross-linked polymeric material is substantially free of a fluoro-containing constituent.

30 23. The intraocular lens of claim 20 wherein the first monomeric component provides about 3% to about 25% by weight of the cross-linked polymeric material.

35 24. The intraocular lens of claim 20 wherein the first monomeric component is selected from the group consisting of 2-ethylhexyl acrylate, 2-ethylhexyl methacrylate, 2,2-dimethylpropyl acrylate, 2,2-dimethylpropyl methacrylate, trimethylcyclohexyl acrylate, trimethylcyclohexyl methacrylate, isobutyl acrylate, isobutyl methacrylate, isopentyl acrylate, isopentyl
40 methacrylate and mixtures thereof.

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
11 May 2000 (11.05.2000)

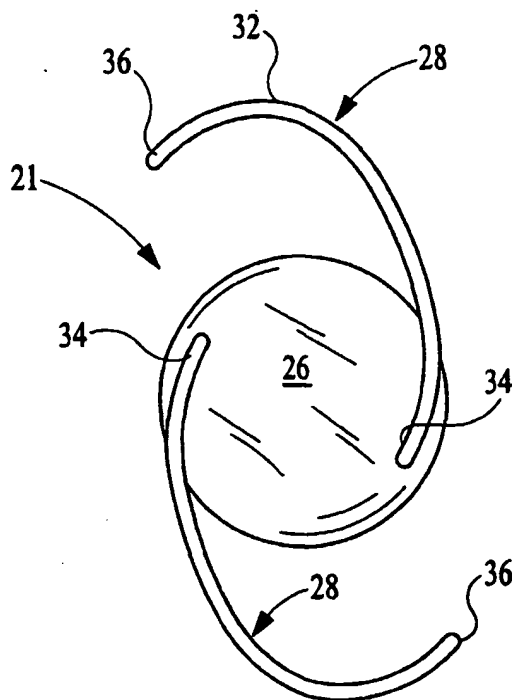
PCT

(10) International Publication Number
WO 00/26698 A1

- (51) International Patent Classification⁷: **G02B 1/04**, **A61L 27/00**
- (21) International Application Number: **PCT/US99/24982**
- (22) International Filing Date: 25 October 1999 (25.10.1999)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/106,381 29 October 1998 (29.10.1998) US
09/265,720 9 March 1999 (09.03.1999) US
09/286,356 5 April 1999 (05.04.1999) US
- (71) Applicant: **ALLERGAN SALES, INC.** [US/US]; 2525 Dupont Drive, Irvine, CA 92612 (US).
- (72) Inventors: **MAKKER, Harish, C.**; 27371 Osuna, Mission Viejo, CA 92691 (US). **LIAO, Xiugao**; 24 Del Ventura, Irvine, CA 92606 (US). **WEINSCHENK, Joseph, I., III**; 37 Dover Place, Laguna Niguel, CA 92677 (US).
- (74) Agents: **DONOVAN, Stephen et al.**; Allergan Sales, Inc., 2525 Dupont Drive, Irvine, CA 92612 (US).
- (81) Designated States (*national*): AU, BR, CA, JP, KR.
- (84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- Published:
— with international search report
— with amended claims
- Date of publication of the amended claims: 13 July 2000
- (48) Date of publication of this corrected version: 13 September 2001
- (15) Information about Correction:
see PCT Gazette No. 37/2001 of 13 September 2001, Section II

[Continued on next page]

(54) Title: INTRAOCULAR LENSES MADE FROM POLYMERIC COMPOSITIONS



(57) Abstract: Ophthalmic lenses, such as intraocular lenses, include cross-linked polymeric materials having a first constituent derived from a first monomeric component selected from the group consisting of acrylates, methacrylates and mixtures thereof, and a second constituent derived from a second component in an amount effective as a cross linker in the cross-linked polymeric material. The cross-linked polymeric material has branched chain alkyl groups, preferably included with at least a portion of the first monomeric component, in an amount effective to reduce the tackiness of the cross-linked polymeric material relative to a substantially identical cross-linked polymeric material without the branched chain alkyl groups.

WO 00/26698 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.